FIG. 1

Feedstock

Heat
Source

t_1 Vaporization

t_2 Condensation

t_3 Aggregation

t_4 Particle Delivery
       through
       Boundary Layer

Assisted
Deposition
(1. Thermophoresis
2. Electromagnetic Fields
3. Condensation)

t_5 Deposition

t_6 Particle Conversion
       into Epitaxial Deposit

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6A

XeCl-laser 1

imaging frame

1000°C

water 140

120

2

130

100

d

Nd:YAG laser 110

gas flow

FIG. 6B

XeCl- laser pulse

Δt

$\Delta \tau$

ICCD gate,100 ns

t

Nd:YAG laser pulse

FIG. 6C

imaging frame

tube axis

target

2   1 cm   0
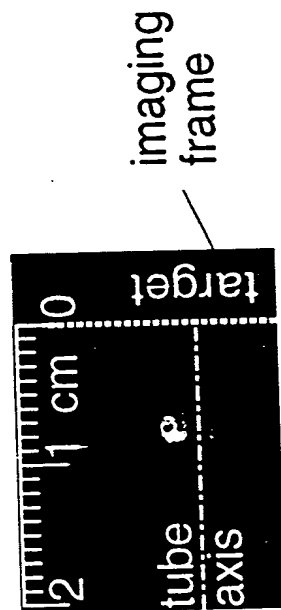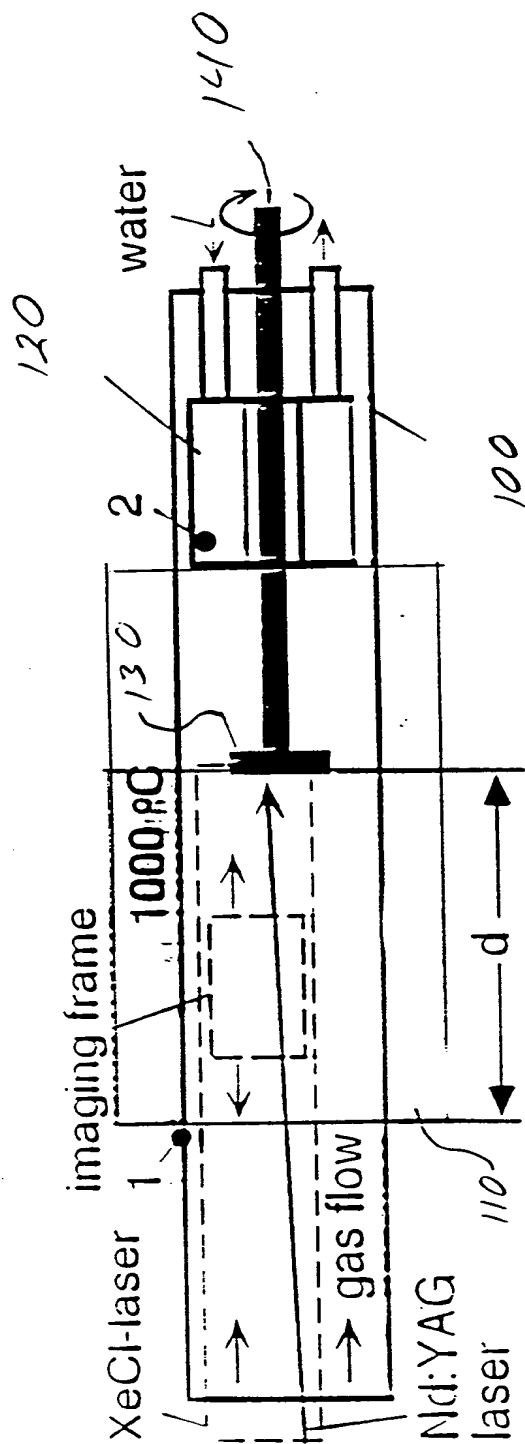
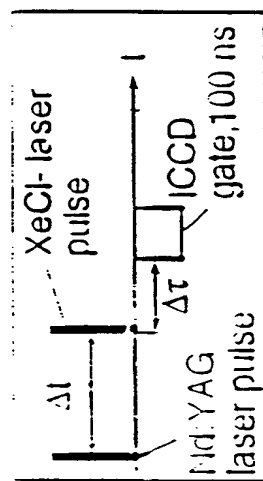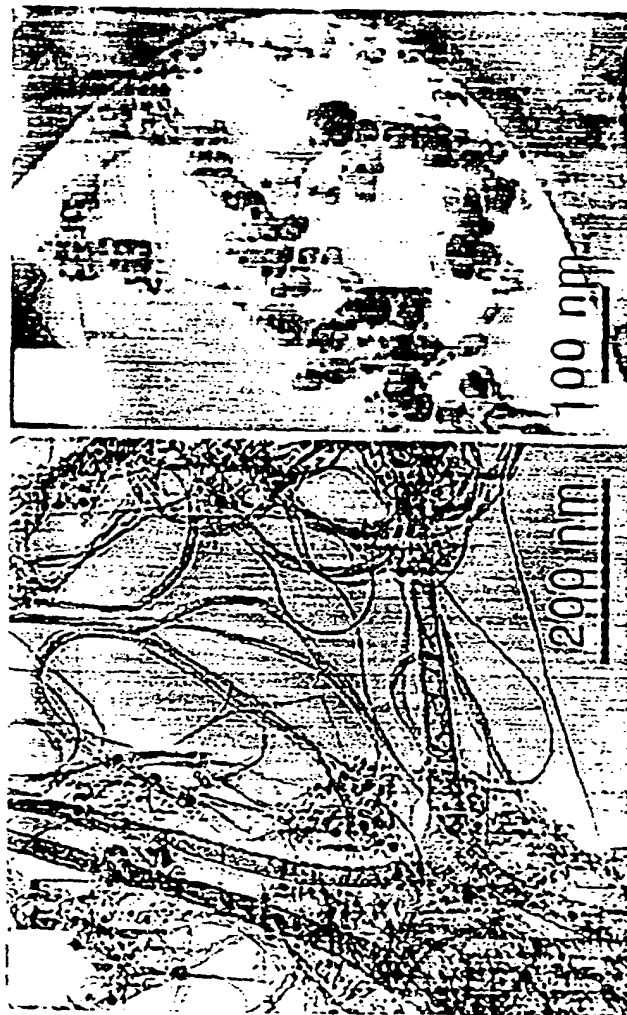FIG. 6C

FIG. 7B

FIG. 7A
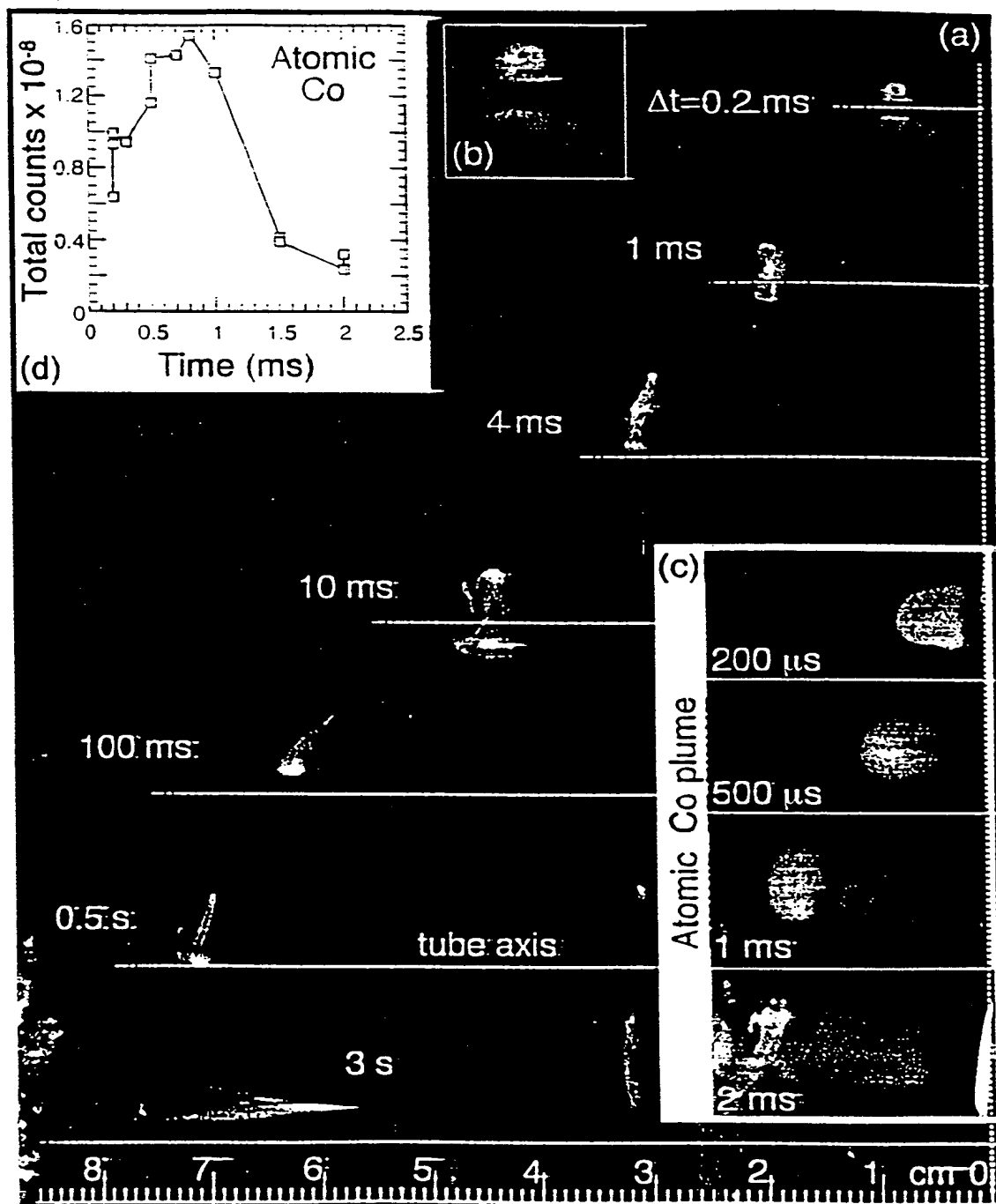
FIG. 8A. FIG. 8B. FIG. 8C. AND FIG. 8D

FIG. 9A

FIG. 9B
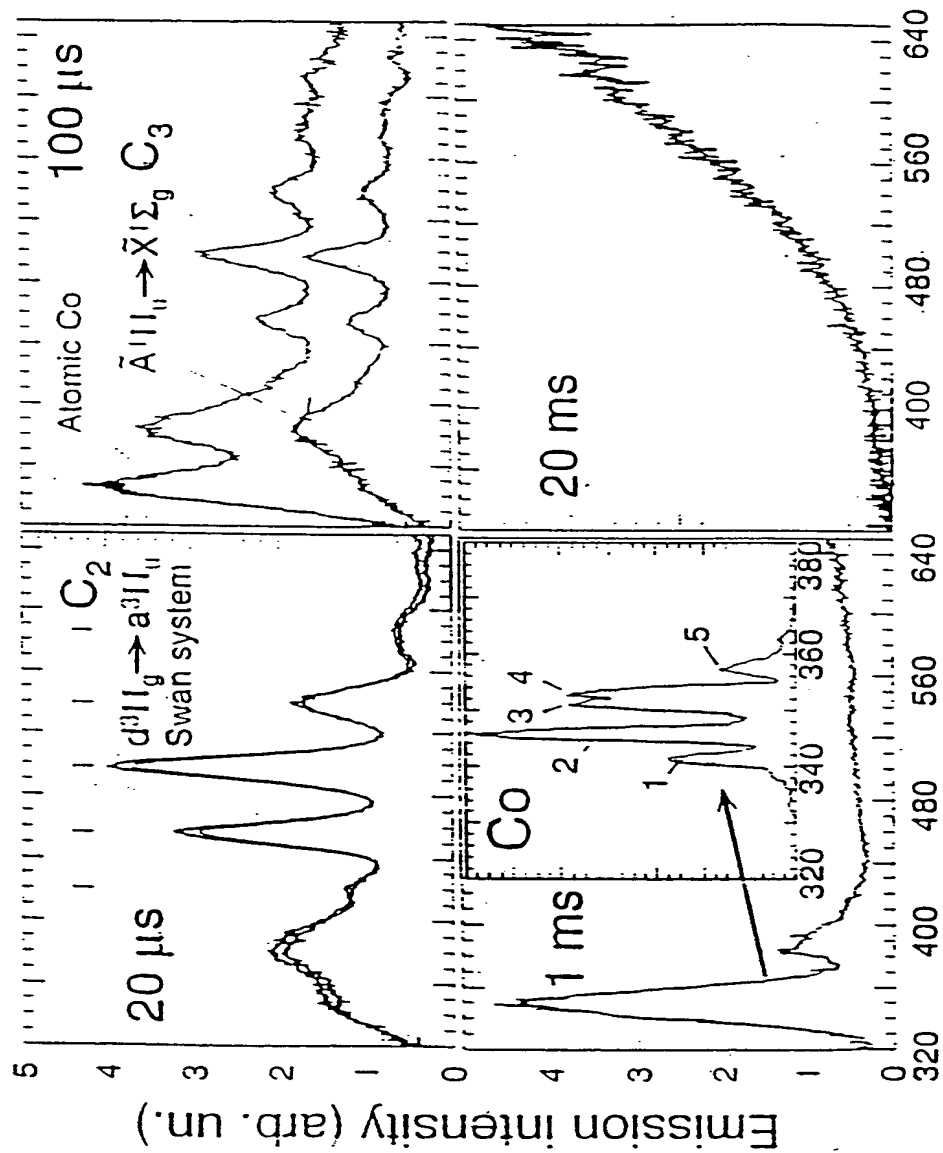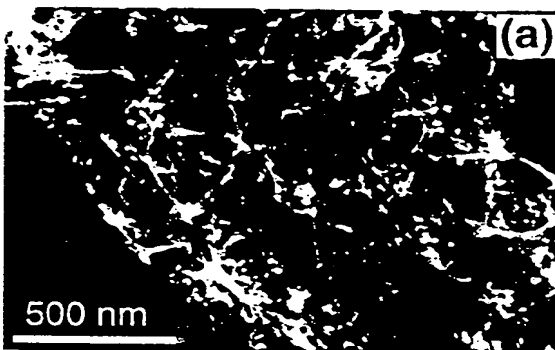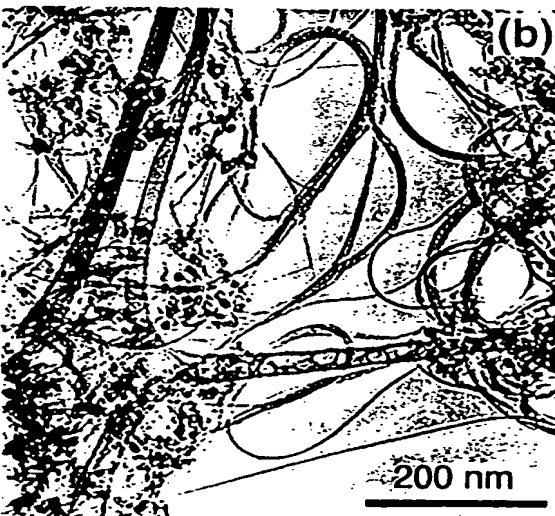
FIG. 9C

FIG. 9D

C_2

$d^3\Pi_g \to a^3\Pi_u$
Swan system

20 μs

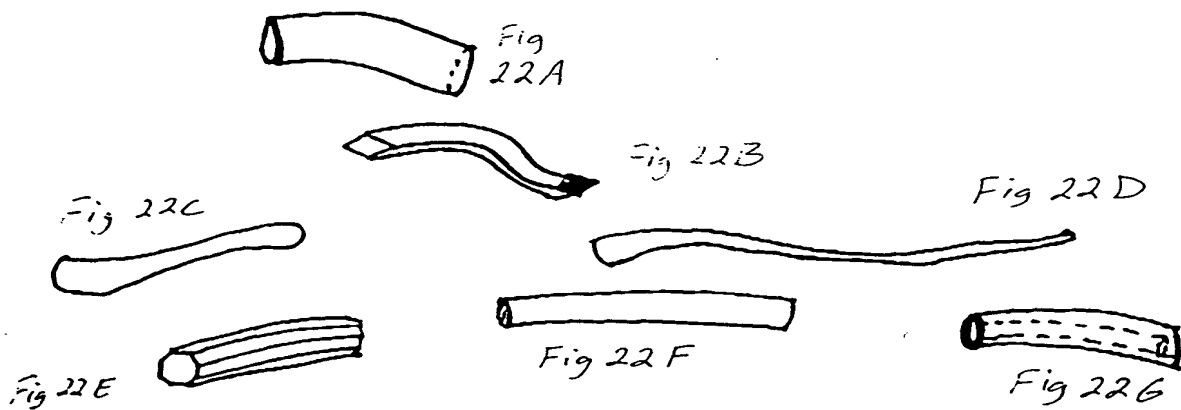Atomic Co

$\tilde{A}^1\Pi_u \to \tilde{X}^1\Sigma_g$ C_3

100 μs

1 ms

Co

20 ms

Wavelength (nm)

Emission intensity (arb. un.)

Fig
22A

Fig 22B

Fig 22C

Fig 22 D

Fig 22E

Fig 22 F

Fig 22G

FIG. 10A

500 nm

FIG. 10B

200 nm

of
of
Intersections

0°　　90°　180°　270°　360°

# of intersection

Fig 23

(a)

9 nm

FIG. 11A

(b)

1 nm
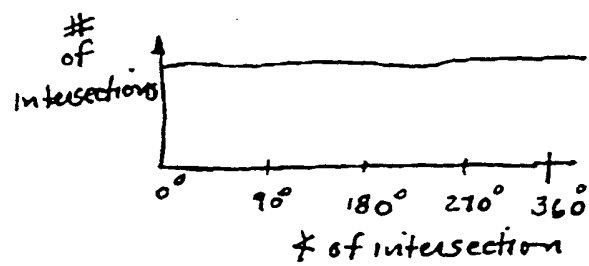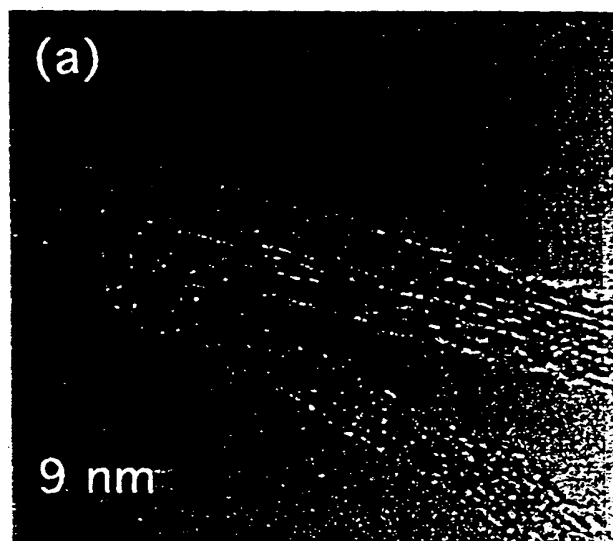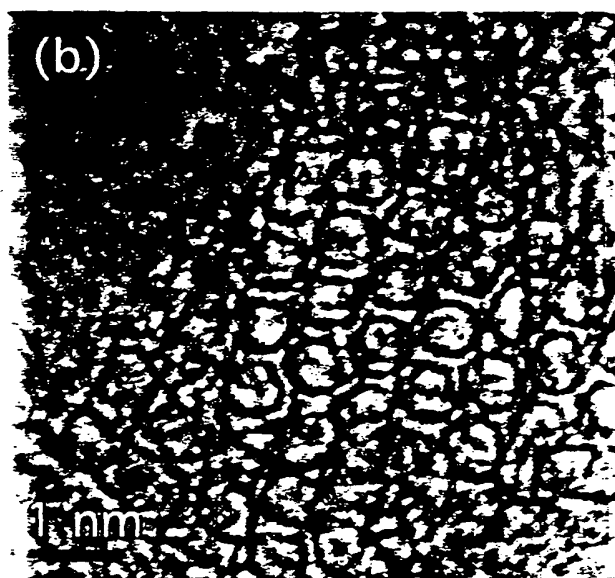
FIG. 11B
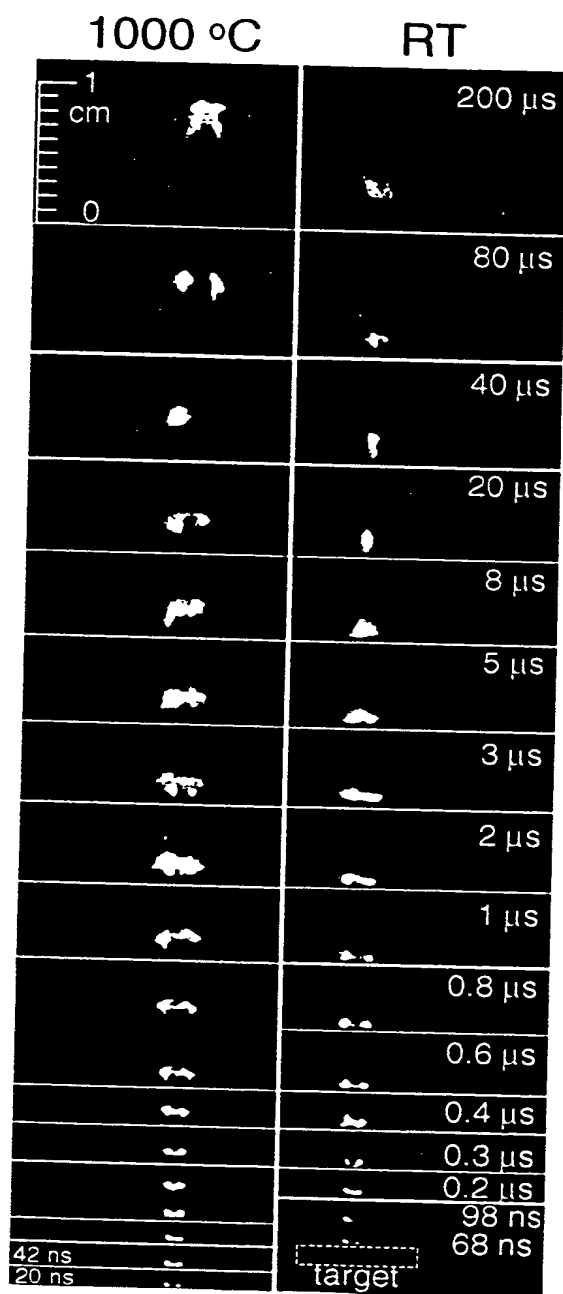
FIG. 12
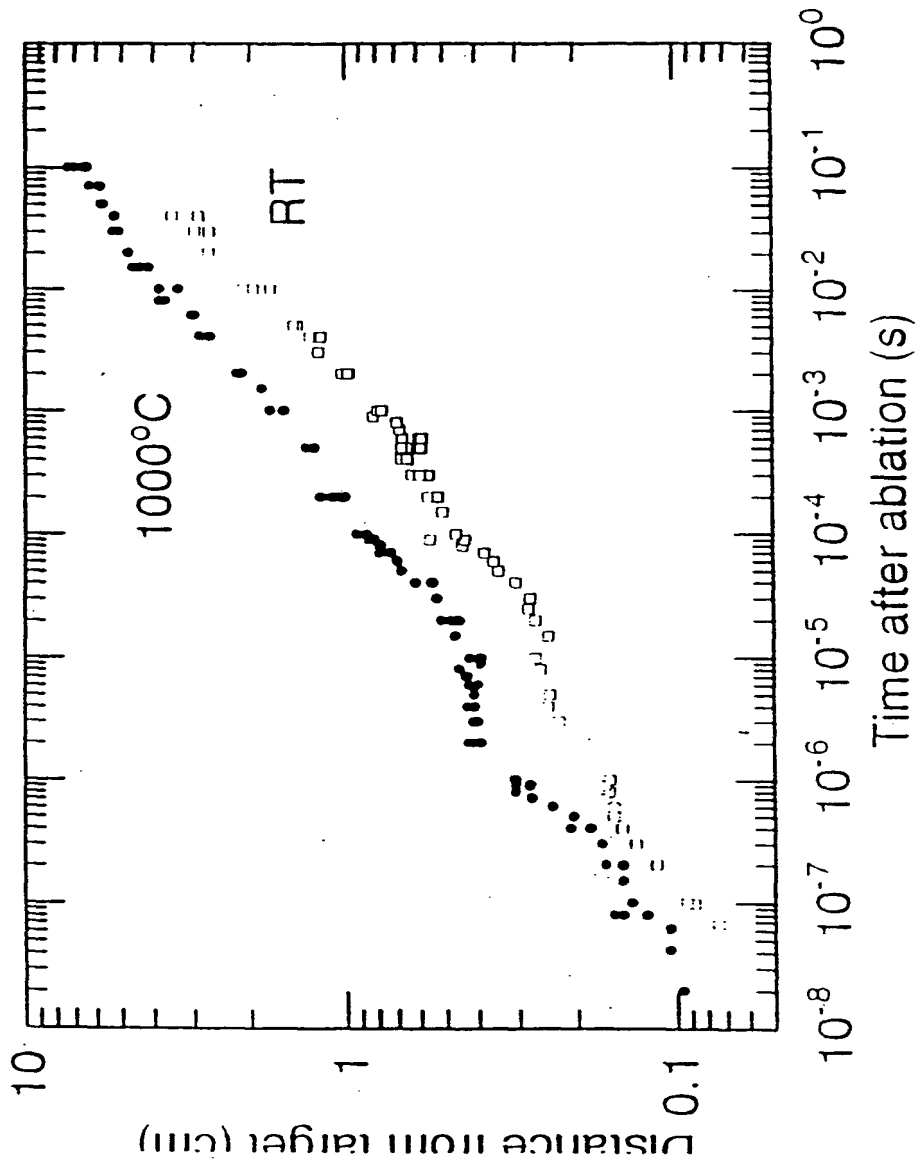
FIG. 13
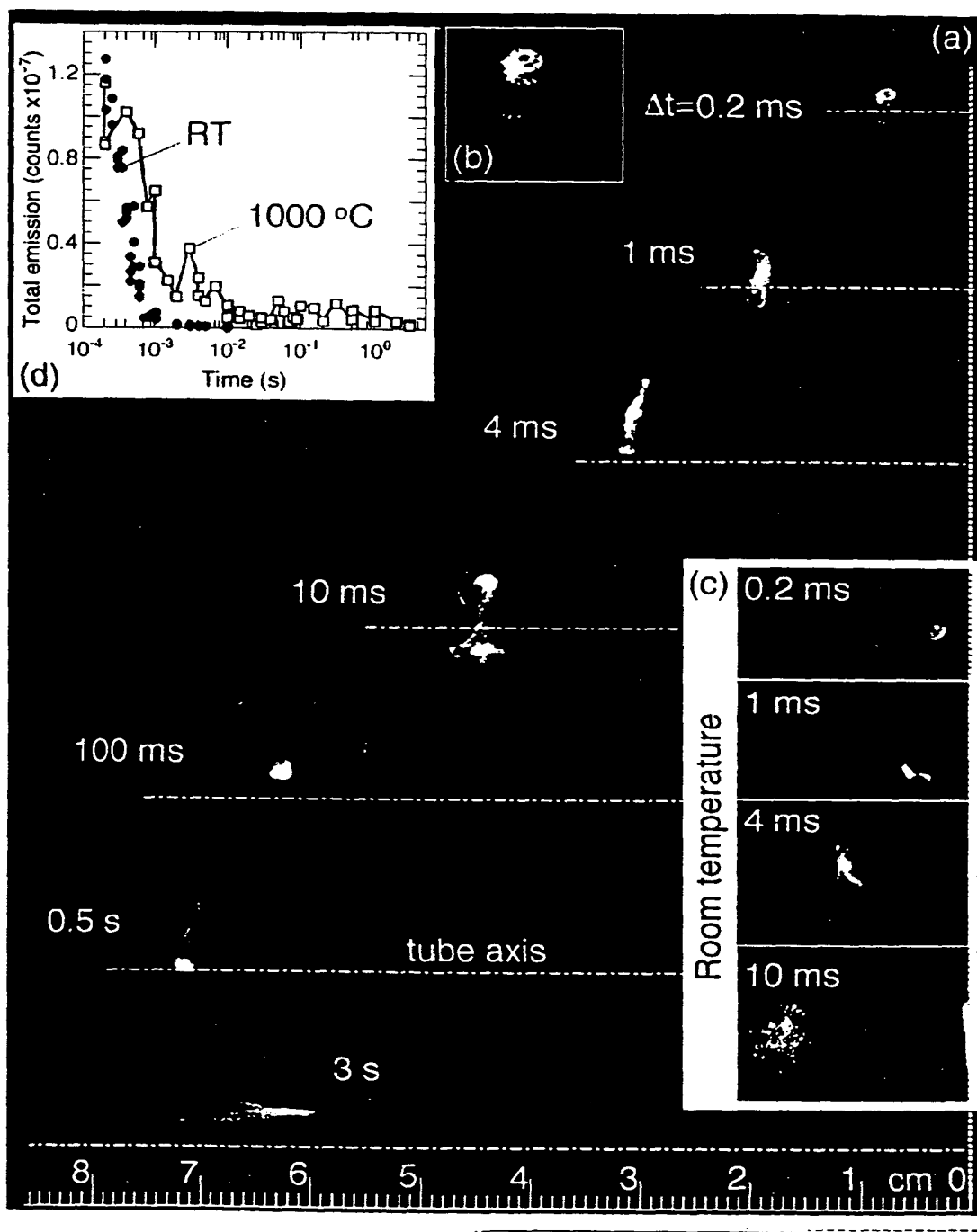
FIG. 14A. FIG. 14B. FIG. 14C AND FIG. 14D

(a) target laser beam

100 µs

FIG. 15A

(b)

200 µs

FIG. 15B

(c)

1 ms

FIG. 15C

(d)

10 ms

FIG. 15D

(e)

100 ms

FIG. 15E

◄— 4 cm —►

Fig 24

FIG. 16A

FIG. 16B
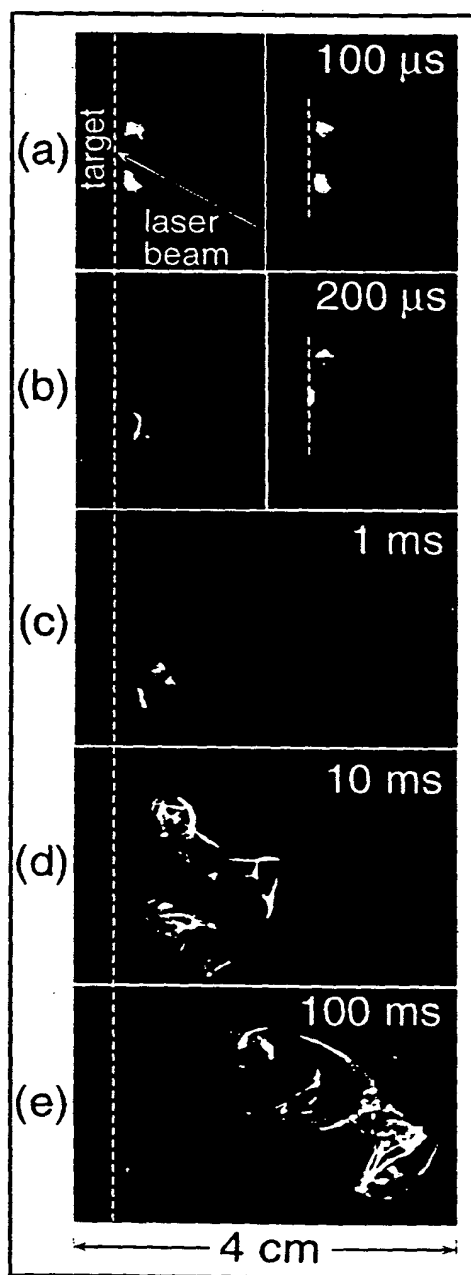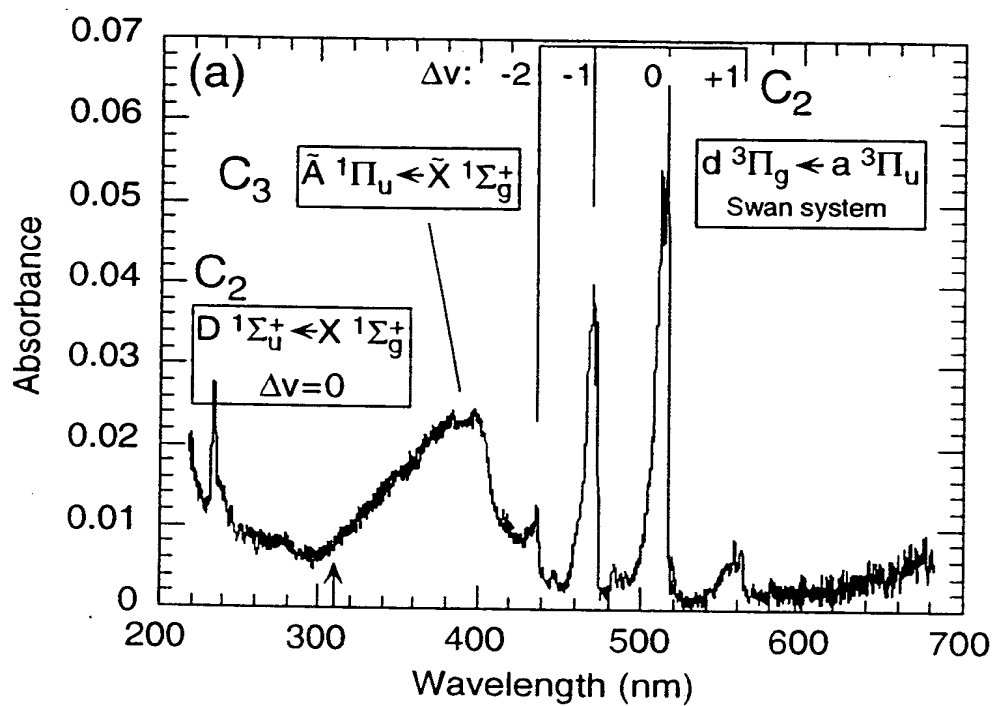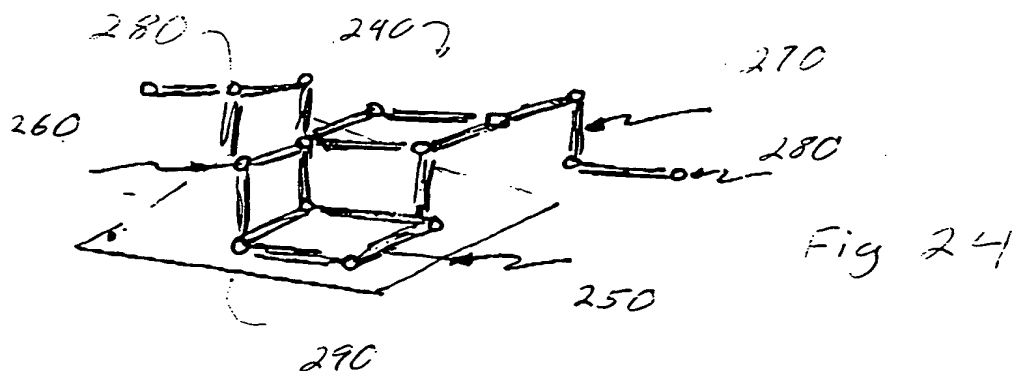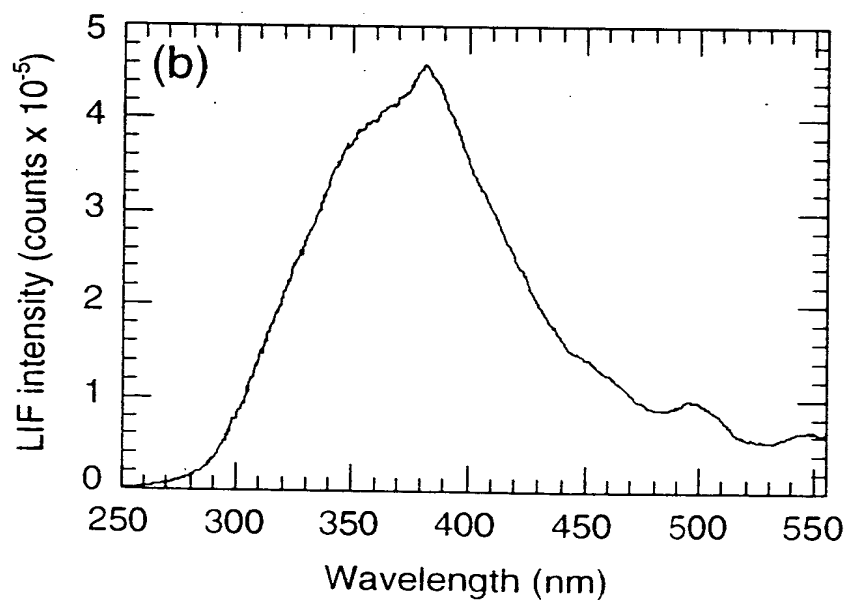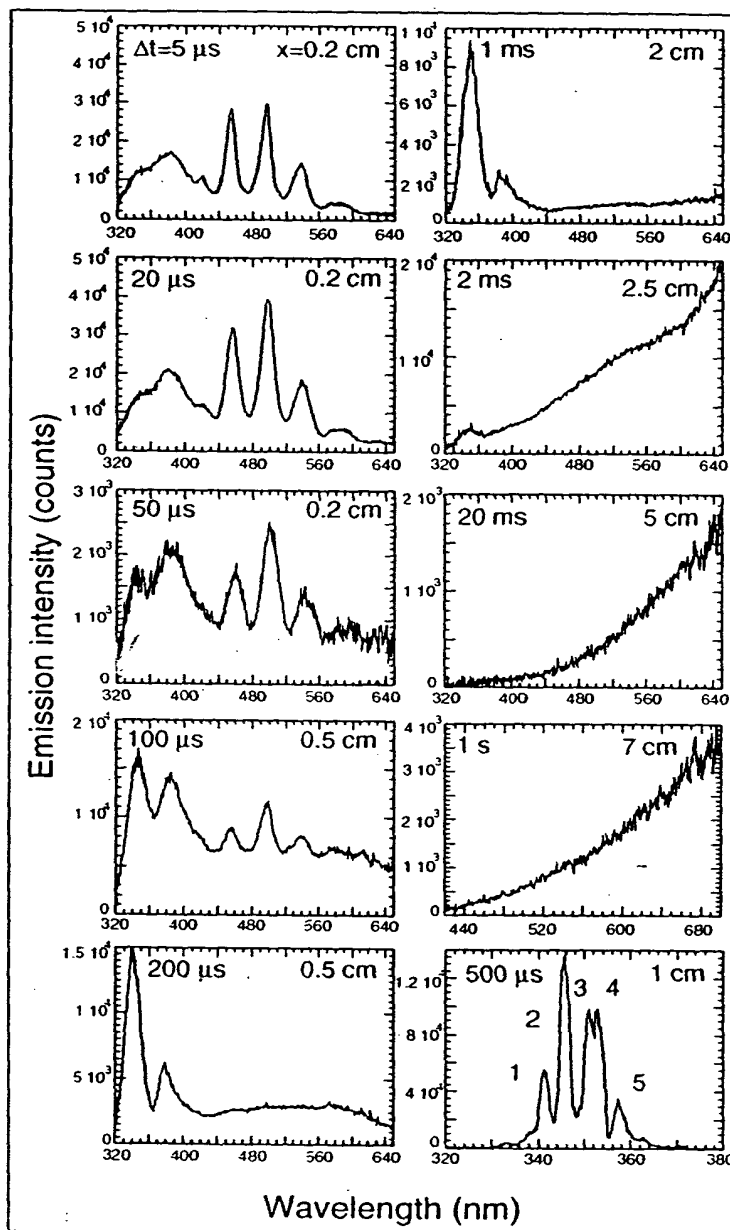
FIG. 17A

FIG. 17B

FIG. 17C

FIG. 17D

FIG. 17E

FIG. 17F

FIG. 17G

FIG. 17H
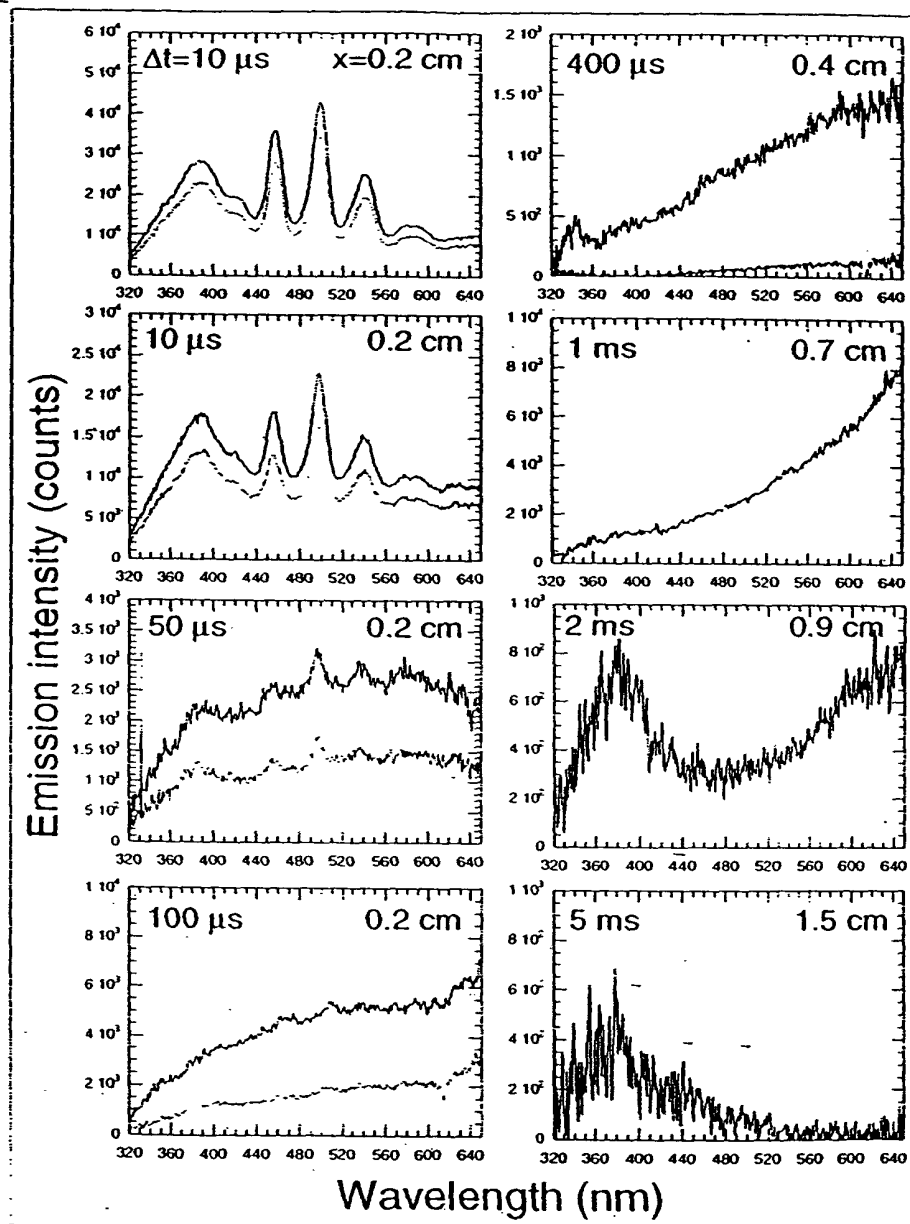
FIG. 17I

FIG. 17J

FIG. 18A

FIG. 18B

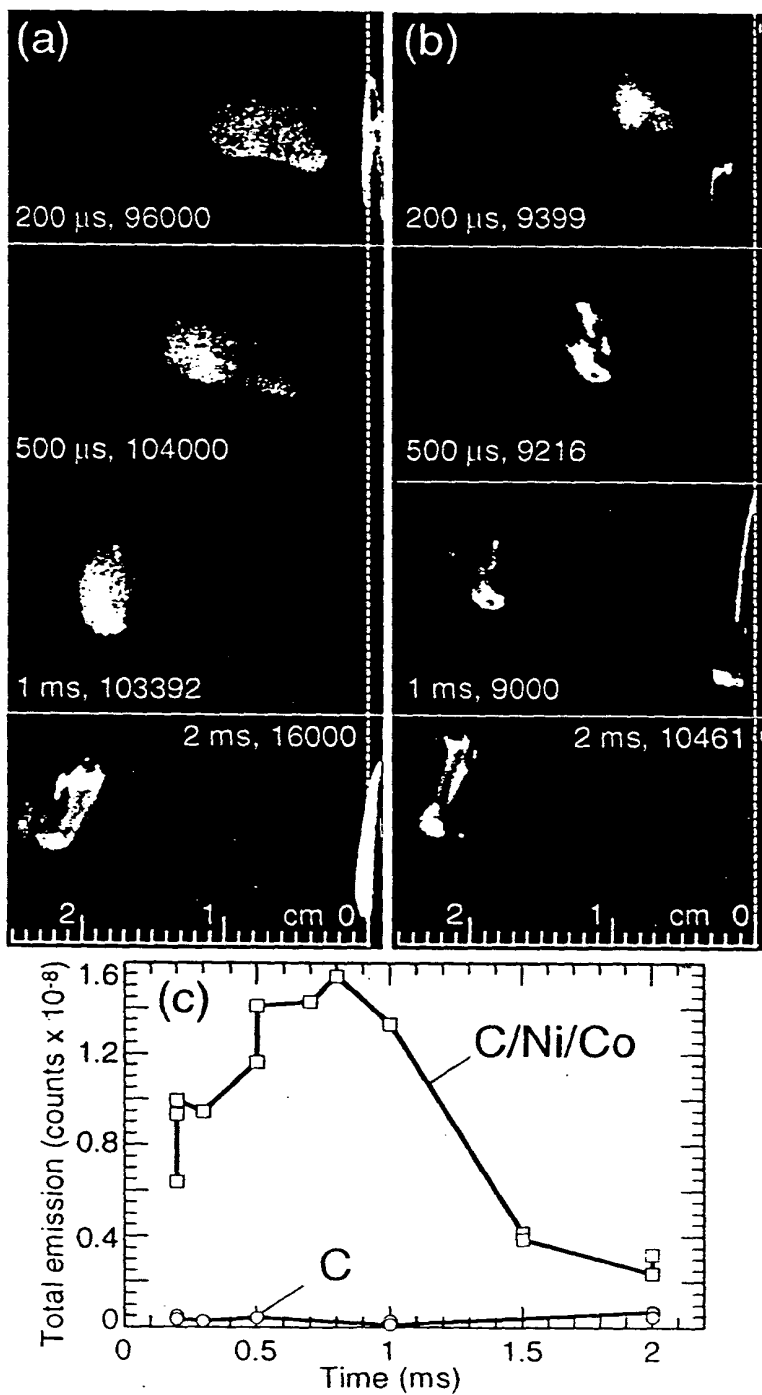FIG. 18C

FIG. 18D

FIG. 18I

FIG. 18

FIG. 18G

FIG. 18

Emission intensity (counts)

Wavelength (nm)

Δt=10 μs   x=0.2 cm

400 μs   0.4 cm

10 μs   0.2 cm

1 ms   0.7 cm

50 μs   0.2 cm

2 ms   0.9 cm

100 μs   0.2 cm

5 ms   1.5 cm

FIG. 19A. FIG. 19B. AND FIG. 19C

(b)

100 nm

(a) Δt=0.2 ms

1 ms

4 ms

8 ms

20 ms

40 ms

200 ms

300 ms

500 ms

target position

10 9 8 7 6 5 4 3 2 1 cm 0

FIG. 20A AND FIG. 20B

FIG. 21

200 nm

Fig 25

200 nm

Fig. 26